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(54) **Disposable absorbent undergarment**

Absorbierende Wegwerfunterwäsche

Sous-vêtement absorbant jetable

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Description

[0001] The present invention relates to disposable absorbent undergarments and more particularly to such undergarments of pants type, such as disposable diapers, training pants for babies, incontinence pants, and the like.

[0002] US patent No. 4,597,760 discloses a body fluid absorbent garment comprising an overgarment and a body fluid absorbent insert adapted to be detachably attached to the overgarment. The body fluid absorbent garment is used as a disposable diaper or reusable diaper. The insert comprises a liquid-permeable topsheet, a liquid-impermeable backsheet and an absorbent core wherein the insert is formed on its lower surface at four corners with adhesive regions destined to be releasably fastened to predetermined regions provided on the upper surface of the overgarment.

[0003] In making the body fluid absorbent undergarment, it is often tried to facilitate the undergarment to be worn on the wearer's body by providing a peripheral edge extending along the waist line with a circumferential stretchability. However, if the peripheral edge is provided with such a circumferential stretchability in the pants type garment having a waist-opening and a pair of leg-openings, it is inevitable that a plurality of gathers should be formed along said peripheral edge. When the above-mentioned known technique is applied to such an undergarment so that an absorbent pad corresponding to said insert may be detachably attached to the pants corresponding to said overgarment adjacent the waist-opening, said gathers formed along the peripheral edge extending along the waist line would obstruct operation of said attachment and the pad could not be attached to the pants over an area required to achieve a reliable attachment. Such shortage of the attachment area will result in shortage of a fastening force required and there will be an apprehension that the pad might be unintentionally detached from the pants. In addition, the presence of said gathers in fastening regions will make it difficult to find the fastening regions.

[0004] US-A-4338939 discloses an incontinence pants comprising an outer supporting garment having an expandable waist band and front and rear sides forming two leg-openings. Flaps are sewn along their top borders to the inner surfaces of the front and rear sides and male and female gripper snaps are fastened into the free lower ends of the flaps. An inner disposable diaper has front and rear top edges formed of the top and back-sheets of the diaper, and the diaper is secured in the outer supporting garment by inserting the front and rear top edges between the gripper snaps which when mated together penetrate the front and rear top edges.

[0005] In view of the problem as described, it is a principal object of the invention to provide an undergarment having a circumferentially stretchable waist line peripheral edge allowing the absorbent pad to be easily fastened to the pants without any apprehension that the

pad might be unintentionally detached from the pants.

[0006] Accordingly, the invention consists in a disposable absorbent undergarment having a front section, a rear section, and a crotch section interposed therebetween, the undergarment comprising a pair of leg-openings and a circumferentially stretchable waist-opening, a body fluid absorbent pad including a topsheet, a backsheet and an absorbent panel disposed therebetween and longitudinally extending in and from the crotch section into the front and rear sections, and a pair of first suspending flaps carried on inner sides of the front and rear sections in circumferentially middle regions thereof and hanging down toward said crotch section, said first suspending flaps being provided at free ends thereof with first fastening means which are more rigid than the first suspending flaps themselves, and said pad having second suspending flaps formed of at least one of said topsheet and said backsheet extending outward beyond longitudinally opposite ends of said panel; characterised in that said first suspending flaps hang down from and beyond a peripheral edge region of said waist-opening, and said second suspending flaps are provided with second fastening means which are more rigid than said second suspending flaps themselves and adapted to be releasably fastened to the first fastening means.

[0007] The invention will now be described by way of example with reference to the accompanying drawings, in which:-

Fig. 1 shows a perspective view, partially broken away, of incontinence pants as a specific embodiment of the invention;

Fig. 2 shows a sectional view of the incontinence pants taken along a line II-II in Fig. 1; and

Fig. 3 shows a plan view, partially broken away, of the incontinence pants as longitudinally opened out.

[0008] Incontinence pants 1 shown by Fig.1 in a perspective view as partially broken away is a specific embodiment of the inventive disposable absorbent undergarment. The pants 1 comprise a main body 2 and an absorbent pad 3 detachably attached to the main body 2. The main body 2 has a front section 6, a rear section 7, and a crotch section 8 interposed therebetween. Transversely opposite side edges of the front and rear sections 6, 7 are put one upon another and bonded together along respective heat-seal regions 11 each intermittently extending in their vertical direction so as to form a waist-opening 9. The front and rear sections 6, 7 are provided along respective peripheral edge regions 16 of the waist-opening 9 with first elastic members 13 each comprising a plurality of elastic elements attached thereto in their circumferentially tensioned or stretched condition and along lower waist regions 17 lying downward of the peripheral edge regions 16 with second elastic members 14 each comprising also a plurality of elastic elements attached thereto in their circumferentially

tensioned or stretched condition. The crotch section 8 has a sheet member 15 which is stretchable in its longitudinal direction and joined at its longitudinally opposite ends 8A, 8B to lower ends 6B, 7B (Fig. 2) of the front and rear sections 6, 7, respectively, immediately above upper ends 10A of the respective leg-openings 10, and thereby forms a pair of leg-openings 10. The main body 2 is provided on its inner side with the absorbent pad 3 longitudinally extending in and from the crotch section 8 into the front and rear sections 6, 7.

[0009] Fig. 2 is a sectional view taken along a line II-II in Fig. 1. In the main body 2, each of the front and rear sections 6, 7 comprises a topsheet 25 and a backsheet 26 both made of a nonwoven fabric and intermittently bonded to an air/moisture permeable plastic film 27 disposed therebetween. The first and second elastic members 13, 14 are disposed between the topsheet 25 and the film 27 and secured to the inner surface of at least one of the topsheet 25 and film 27. The sheet member 15 as a component of the crotch section 8 comprises a topsheet 30 and a backsheet 31 both made of a nonwoven fabric and an air/moisture-permeable plastic film 32 which is disposed therebetween and stretchable at least in its longitudinal direction, wherein both the topsheet 30 and the backsheet 31 are intermittently bonded to the film 32. In the main body 2, the film 27 assures that the front and rear sections 6, 7 have a desired tensile strength and the film 32 assures that the crotch section 8 has a desired tensile strength and stretchability.

[0010] The front and rear sections 6, 7 respectively carry on their circumferentially middle regions first suspending flaps 20A, 20B. These flaps 20A, 20B are made of a flexible sheet 35 such as a nonwoven fabric which is soft and agreeable to touch, another cushiony and spongy material such as a plastic film or polyurethane foamed sheet, or a laminate of the nonwoven fabric and spongy material. The first suspending flaps 20A, 20B have their base ends 35A joined by means of hot melt adhesive 37 to the inner surface of the peripheral edge region 16 of the waist-opening 9 and their free ends 35B hanging down toward the crotch section 8 to extend into the lower waist region 17. The free ends 35B are provided on their surface opposed to the inner surface of the main body 2 with first fastening means 39 comprising one component 36A of a pair of mechanical tape fasteners 36, such as loop and hook systems, which is available under the trade name of Velcro, secured thereto by a suitable means (not shown).

[0011] The pad 3 comprises an absorbent panel 42 which comprises, in turn, a compression-molded mixture 40 of fluff pulp fibers and discrete particles of a water insoluble hydrogel and tissue papers 41 covering it, and a topsheet 43 and a backsheet 44 covering upper and lower surfaces of the panel 42, respectively. Portions of the topsheet 43 and the backsheet 44 extending outward beyond a peripheral edge of the panel 42 are put one upon another and bonded together. Of such extensions, portions extending outward beyond longitudi-

nally opposite ends of the panel 42 form a pair of second suspending flaps 18, 19 and are interposed between the front and rear sections 6, 7 and the first suspending flaps 20A, 20B, respectively. Surfaces of the second suspending flaps 18, 19 opposed to the first suspending flaps 20A, 20B are provided with second fastening means 51 comprising the other components 36B of the tape fastener 36 secured thereto by a suitable means (not shown) and operatively associated with the respective components 36A of the tape fastener 36, at which the components 36A, 36B may be releasably engaged together. The topsheet 43 of the pad 3 is made of a liquid-permeable nonwoven fabric or a plastic film. While the backsheet 44 is preferably made of a liquid-impermeable plastic film, an extremely thin plastic film covered with a nonwoven fabric to improve the strength as well as the touch of the film may be also useful as a material for the backsheet 44, and even a liquid-permeable nonwoven fabric may be used to form the backsheet 44 so long as the panel 42 has a sufficient moisture holding capability.

[0012] Fig. 3 shows the pants 1 separated along the heat-seal regions 11 into the front and rear sections 6, 7 and opened out from the position shown by Fig. 1 in the longitudinal direction as indicated by arrows P, Q in a plan view partially broken away. As shown, the pants 1 are opened out also in the transverse direction and the gathers formed in the front and rear sections 6, 7 as well as in the crotch section 8 in Fig. 1 disappear as the pants 1 are opened in these two directions. The first suspending flaps 20A, 20B are provided adjacent their transversely opposite ends with the one components 36A of the tape fastener 36 and the second suspending flaps 18, 19 are provided adjacent their transversely opposite ends with the other components 36B of the tape fastener 36 operatively associated with the components 36A. The pad 3 is provided along its transversely opposite side edges with longitudinally extending elastic members 50, respectively, which are disposed between the topsheet 43 and the backsheet 44 and secured in a tensioned or stretched condition to the inner surface of at least one of these two sheets 43, 44.

[0013] In the pants 1 constructed as described above, the flexible sheet 35 for the first suspending flaps 20A, 20B as well as the topsheet 43 and the backsheet 44 of the pad 3 are preferably made of a soft material which is agreeable to touch and does not adversely affect the circumferential stretchability of the front and rear sections 6, 7. For bonding the first suspending flaps 20A, 20B to the main body 2 and for bonding the topsheet 43 and the backsheet 44 together, it is preferred to use soft type adhesive or to arrange intermittent bonding spots in consideration that these components should keep their softness. It is also possible to define the second suspending flaps 18, 19 by one of the topsheet 43 and the backsheet 44 if it is desired to improve the softness in these flaps 18, 19. As a criterion of said softness, the first suspending flaps 20A, 20B and the second sus-

pending flaps 18, 19 preferably have a stiffness less than 150mm as measured according to JIS P 8143. The presence of the tape fasteners components 36A, 36B increases the rigidities in the first and second fastening means 39, 51 relative to the first and second suspending flaps 20A, 20B, 18, 19 so that the presence of these first and second fastening means 39, 51 can be easily detected by the user's hand as it touches the first and second suspending flaps 20A, 20B, 18, 19 owing to said higher rigidities. If the rigidities of the first and second fastening means 39, 51 themselves are insufficient, such shortage can be compensated by a rigidity of the adhesive used to bond the fastener components 36A, 36B to the respective first and second suspending flaps 20A, 20B, 17, 18.

[0014] In order to form the first and second fastening means 39, 51, the tape fastener components 36A, 36B may be replaced by pressure-sensitive adhesive. For example, the tape fastener components 36A or 36B may be replaced by pressure-sensitive adhesive tape fastener applied to their underlying member at the corresponding regions to form adhesive fastening regions and the other tape fastener components 36B or 36A may be replaced by relatively thick plastic film sheets bonded to their underlying members at the corresponding regions so that said adhesive fastening regions may be releasably fastened thereto. Instead of these pressure-sensitive adhesive and plastic film sheets, autohesion type adhesive may be applied to both the first and second fastening means 39, 51 so that the respectively facing pairs of fastening regions coated with this autohesion type adhesive may be separably bonded together. If the first and second fastening means 39, 51 can not obtain the desired rigidity merely by application of the pressure-sensitive adhesive and bonding of the plastic film sheets, nonwoven fabric or plastic film sheets may be additionally laminated on these fastening means.

[0015] In the disposable absorbent undergarment in accordance with an embodiment of the invention, the first and second suspending flaps 20A, 20B, 18, 19 can be reliably fastened together over adequately large areas without being affected by the gathers formed in the elasticized peripheral edge regions 16, since the first and second fastening means 39, 51 respectively provided on the first and second suspending flaps 20A, 20B, 18, 19 are more rigid than the first and second suspending flaps 20A, 20B, 18, 19 themselves, and extend downward beyond the elasticized peripheral edge regions 16. Furthermore, such rigidity facilitates the presence of these first and second fastening means 39, 51 to be detected and facilitates the pad to be smoothly mounted or interchanged.

[0016] The first fastening means 39 are provided with their surfaces facing the inner surface of the main body 2 and, in addition, the first suspending flaps 20A, 20B are cushiony, so the first fastening means 39 give the wearer neither feeling of incompatibility nor uncomfortable irritation, in spite of their relatively high rigidity.

[0017] The longitudinally stretchable crotch section 8 contracts in the longitudinal direction and therefore closely contacts the pad 3 against the wearer's crotch to prevent the body fluid from leaking therefrom.

Claims

1. A disposable absorbent undergarment (1) having a front section (6), a rear section (7), and a crotch section (8) interposed therebetween, said undergarment (1) comprising a pair of leg-openings (10) and a circumferentially stretchable waist-opening (9), a body fluid absorbent pad (3) including a topsheet (43), a backsheet (44) and an absorbent panel (42) disposed therebetween and longitudinally extending in and from said crotch section (8) into said front and rear sections (6,7), and a pair of first suspending flaps (20A,20B) carried on inner sides of said front and rear sections (6,7) in circumferentially middle regions thereof and hanging down toward said crotch section (8), said first suspending flaps (20A,20B) being provided at free ends (35B) thereof with first fastening means (39) which are more rigid than said first suspending flaps (20A,20B) themselves, and said pad (3) having second suspending flaps (18,19) formed of at least one of said topsheet (43) and said backsheet (44) extending outward beyond longitudinally opposite ends of said panel (42); **characterised in that** said first suspending flaps (20A,20B) hang down from and beyond a peripheral edge region (16) of said waist-opening (9), and said second suspending flaps (18,19) are provided with second fastening means (51) which are more rigid than said second suspending flaps (18,19) themselves and adapted to be releasably fastened to said first fastening means (39).
2. The undergarment as claimed in Claim 1, wherein said crotch section (8) is stretchable in the longitudinal direction thereof.
3. The undergarment as claimed in Claim 1 or 2, wherein said first fastening means (39) are provided on surfaces of said first suspending flaps (20A,20B) facing an inner surface of said undergarment (1).
4. The undergarment as claimed in Claim 1, 2 or 3, wherein said first suspending flaps (20A,20B) are made of a soft spongy material presenting a cushiony function.
5. The undergarment as claimed in Claim 1, 2, 3 or 4, wherein said first and second fastening means (39,51) comprise mechanical tape fasteners.
6. The undergarment as claimed in any preceding Claim, wherein said first and second fastening

means (39,51) comprise pressure-sensitive adhesive tape fasteners.

7. The undergarment as claimed in any preceding Claim, wherein said front and rear sections (6,7) and said crotch section (8) comprise a topsheet (25,30) and a backsheet (26,31) both made of a nonwoven fabric and an air/moisture permeable plastic film (27,32) disposed therebetween, transversely opposite side edges of said front and rear sections (6,7) being put one upon another and bonded together, and longitudinally opposite ends (8A,8B) of said crotch section (8) being joined to lower ends (6B,7B) of said front and rear sections (6,7).
8. The undergarment as claimed in any preceding Claim, wherein said front and rear sections (6,7) are provided along respective peripheral edge regions (16) of said waist-opening (9) with first elastic means (13) attached thereto in a circumferentially tensioned condition thereof and along respective lower waist regions (17) lying downward of said peripheral edge regions (16) with second elastic means (14) attached thereto in a circumferentially tensioned condition thereof, said first and second elastic means (13,14) each comprising a plurality of elastic elements spaced apart parallel to each other.
9. The undergarment as claimed in Claim 8, wherein the free ends (35B) of said first suspending flaps (20A,20B) extend into said lower waist regions (17).

Patentansprüche

1. Absorbierende Wegwerfunterwäsche (1) mit einem vorderen Abschnitt (6), einem hinteren Abschnitt (7) und einem zwischen diesen angeordneten Schrittabschnitt (8), wobei die Unterwäsche (1) ein Paar Beinöffnungen (10) und eine umfangmäßig dehnbare Taillenöffnung (9), einen Körperflüssigkeit aufsaugenden Kern (3), der eine Oberschicht (43), eine Unterschicht (44) und eine zwischen diesen angeordnete Saugeinlage (42) umfaßt, die sich in Längsrichtung in und von dem Schrittabschnitt (8) in den vorderen und hinteren Abschnitt (6, 7) hinein erstreckt, und ein Paar erster Hängeklappen (20A, 20B) umfaßt, die auf der inneren Seiten des vorderen und hinteren Abschnitts (6, 7) in deren umfangmäßigen Mittelbereich angeordnet sind und in Richtung des Schrittabschnitts (8) herunterhängen, wobei die ersten Hängeklappen (20A, 20B) an ihrem freien Ende (35B) mit ersten Befestigungsmitteln (39) versehen sind, die steifer als die ersten Hängeklappen (20A, 20B) selbst sind, und der Kern (3) zweite Hängeklappen (18, 19) aufweist, die aus

mindestens einer der Oberschicht (43) und der Unterschicht (44) gebildet sind und sich auswärts über in Längsrichtung gegenüberliegende Enden der Einlage (42) hinaus erstrecken, **dadurch gekennzeichnet, dass** die ersten Hängeklappen (20A, 20B) von einem Umfangsrandbereich (16) der Taillenöffnung (9) und über diesen hinaus herunterhängen und dass die zweiten Hängeklappen (18, 19) mit zweiten Befestigungsmitteln (51) ausgestattet sind, die steifer als die zweiten Hängeklappen (18, 19) selbst sind und so ausgeführt sind, daß sie lösbar an den ersten Befestigungsmitteln (39) befestigbar sind.

2. Unterwäsche nach Anspruch 1, bei der der Schrittabschnitt (8) in seiner Längsrichtung dehnbar ist.
3. Unterwäsche nach Anspruch 1 oder 2, bei der die ersten Befestigungsmittel (39) auf Flächen der ersten Hängeklappen (20A, 20B) vorgesehen sind, die einer Innenfläche der Unterwäsche (1) gegenüberliegen.
4. Unterwäsche nach Anspruch 1, 2 oder 3, bei der die ersten Hängeklappen (20A, 20B) aus weichem schwammartigem Material hergestellt sind, das eine Polsterfunktion ausübt.
5. Unterwäsche nach Anspruch 1, 2, 3 oder 4, bei der die ersten und zweiten Befestigungsmittel (39, 51) mechanische Bandbefestiger umfassen.
6. Unterwäsche nach einem der vorstehenden Ansprüche, bei der die ersten und zweiten Befestigungsmittel (39, 51) Haftklebebandbefestiger umfassen.
7. Unterwäsche nach einem der vorstehenden Ansprüche, bei der der vordere und der hintere Abschnitt (6, 7) und der Schrittabschnitt (8) eine Oberschicht (25, 30) und eine Unterschicht (26, 31) umfassen, die beide aus nicht gewebtem Stoff hergestellt sind und zwischen denen ein luft-/feuchtigkeitsdurchlässiger Kunststoffilm (27, 32) angeordnet ist, wobei sich in Querrichtung gegenüberliegende Seitenränder des vorderen und des hinteren Abschnitts (6, 7) übereinander gelegt und miteinander verbindbar sind, und wobei sich in Längsrichtung gegenüberliegende Enden (8A, 8B) des Schrittabschnitts (8) mit unteren Enden (6B, 7B) des vorderen und des hinteren Abschnitts (6, 7) verbindbar sind.
8. Unterwäsche nach einem der vorstehenden Ansprüche, bei der der vordere und der hintere Abschnitt (6, 7) entlang des jeweiligen Umfangsrandbereiches (16) der Taillenöffnung (9) mit ersten Elastikmitteln (13) ausgestattet sind, die davon in um-

fängsmäßig gespanntem Zustand befestigt sind, und entlang des jeweiligen unteren Taillenbereiches (17), der unterhalb des jeweiligen Umfangsrandbereiches (16) liegt, mit zweiten elastischen Mitteln (14) ausgestattet sind, die daran in umfangsmäßigem gespanntem Zustand befestigt sind, wobei die ersten und zweiten elastischen Mittel (13, 14) jeweils eine Mehrzahl elastischer Elemente umfassen, die parallel zueinander beabstandet angeordnet sind.

9. Unterwäsche nach Anspruch 8, bei der die freien Enden (35B) der ersten Hängeklappen (20A, 20B) sich in die unteren Taillenbereiche (17) hinein erstrecken.

Revendications

1. Sous-vêtement absorbant jetable (1) ayant une partie avant (6) et une partie arrière (7) et une partie d'entrejambes (8) interposée entre elles, ledit sous-vêtement (1) comprenant une paire d'ouvertures de jambes (10) et une ouverture de ceinture étirable circonférentiellement (9), un tampon absorbant les fluides corporels (3) comprenant une feuille supérieure (43), une feuille arrière (44) et un panneau absorbant (42) disposé entre elles et s'étendant longitudinalement dans et à partir de la partie d'entrejambes (8) vers lesdites parties avant et arrière (6, 7), et une paire de premiers volets de suspension (20A, 20B) réalisés sur des côtés internes desdites parties avant et arrière (6, 7) dans des zones circonférentiellement médianes de celles-ci et s'étendant vers le bas en direction de ladite partie d'entrejambes (8), lesdits premiers volets de suspension (20A, 20B) étant pourvus à leurs extrémités libres (35B) avec des premiers moyens de fixation (39) qui sont plus rigides que lesdits premiers volets de suspension (20A, 20B) eux-mêmes, et ledit tampon (3) comportant des seconds volets de suspension (18, 19) formés à partir d'au moins l'une parmi ladite feuille supérieure (43) et ladite feuille arrière (44), s'étendant vers l'extérieur au-delà d'extrémités longitudinalement opposées dudit panneau (42) ; **caractérisé en ce que** lesdits premiers volets de suspension (20A, 20B) s'étendent vers le bas à partir de et au-delà d'une zone de bord périphérique (16) de ladite ouverture de ceinture (9), et lesdits seconds volets de suspension (18, 19) sont pourvus de seconds moyens de fixation (51) qui sont plus rigides que lesdits volets de suspension (18, 19) eux-mêmes, et qui sont adaptés à être fixés de manière amovible auxdits premiers moyens de fixation (39).
2. Sous-vêtement selon la revendication 1, dans lequel ladite partie d'entrejambes (8) est étirable dans

sa direction longitudinale.

3. Sous-vêtement selon la revendication 1 ou 2, dans lequel lesdits premiers moyens de fixation (39) sont prévus sur des surfaces desdits premiers volets de suspension (20A, 20B) faisant face à une surface interne dudit sous-vêtement (1).
4. Sous-vêtement selon la revendication 1, 2 ou 3, dans lequel lesdits premiers volets de suspension (20A, 20B) sont réalisées en un matériau spongieux mou présentant une fonction d'amortissement.
5. Sous-vêtement selon la revendication 1, 2, 3 ou 4, dans lequel lesdits premiers et seconds moyens de fixation (39, 51) comprennent des bandes de fixation mécaniques.
6. Sous-vêtement selon l'une quelconque des revendications précédentes, dans lequel lesdits premiers et seconds moyens de fixation (39, 51) comprennent des bandes de fixation adhésives sensibles à la pression.
7. Sous-vêtement selon l'une quelconque des revendications précédentes, dans lequel lesdites parties avant et arrière (6, 7) et ladite partie d'entrejambes (8) comprennent une feuille supérieure (25, 30) et une feuille arrière (26, 31) réalisées toutes deux en une étoffe non tissée, et un film plastique perméable à l'air/humidité (27, 32) disposé entre elles, des bords latéraux transversalement opposés desdites parties avant et arrière (6, 7) étant disposés l'un sur l'autre et liés ensemble, et des extrémités longitudinalement opposées (8A, 8B) de ladite partie d'entrejambes (8) étant reliées à des extrémités inférieures (6B, 7B) desdites parties avant et arrière (6, 7).
8. Sous-vêtement selon l'une quelconque des revendications précédentes, dans lequel lesdites parties avant et arrière (6, 7) sont pourvues le long de zones de bord périphérique respectifs (16) de ladite ouverture de ceinture (9), avec des premiers moyens élastiques (13) fixés à celles-ci dans une condition circonférentiellement tendue, et pourvues le long de zones de ceinture inférieure respectives (17) disposées vers le bas par rapport auxdites zones de bord périphérique (16), avec des seconds moyens élastiques (14) fixés à celles-ci dans une condition circonférentiellement tendue, lesdits premiers et seconds moyens élastiques (13, 14) comprenant chacun une pluralité d'éléments élastiques espacés et parallèles les uns aux autres.
9. Sous-vêtement selon la revendication 8, dans lequel les extrémités libres (35B) desdits premiers volets de suspension (20A, 20B) s'étendent dans les-

dites zones de ceinture inférieure (17).

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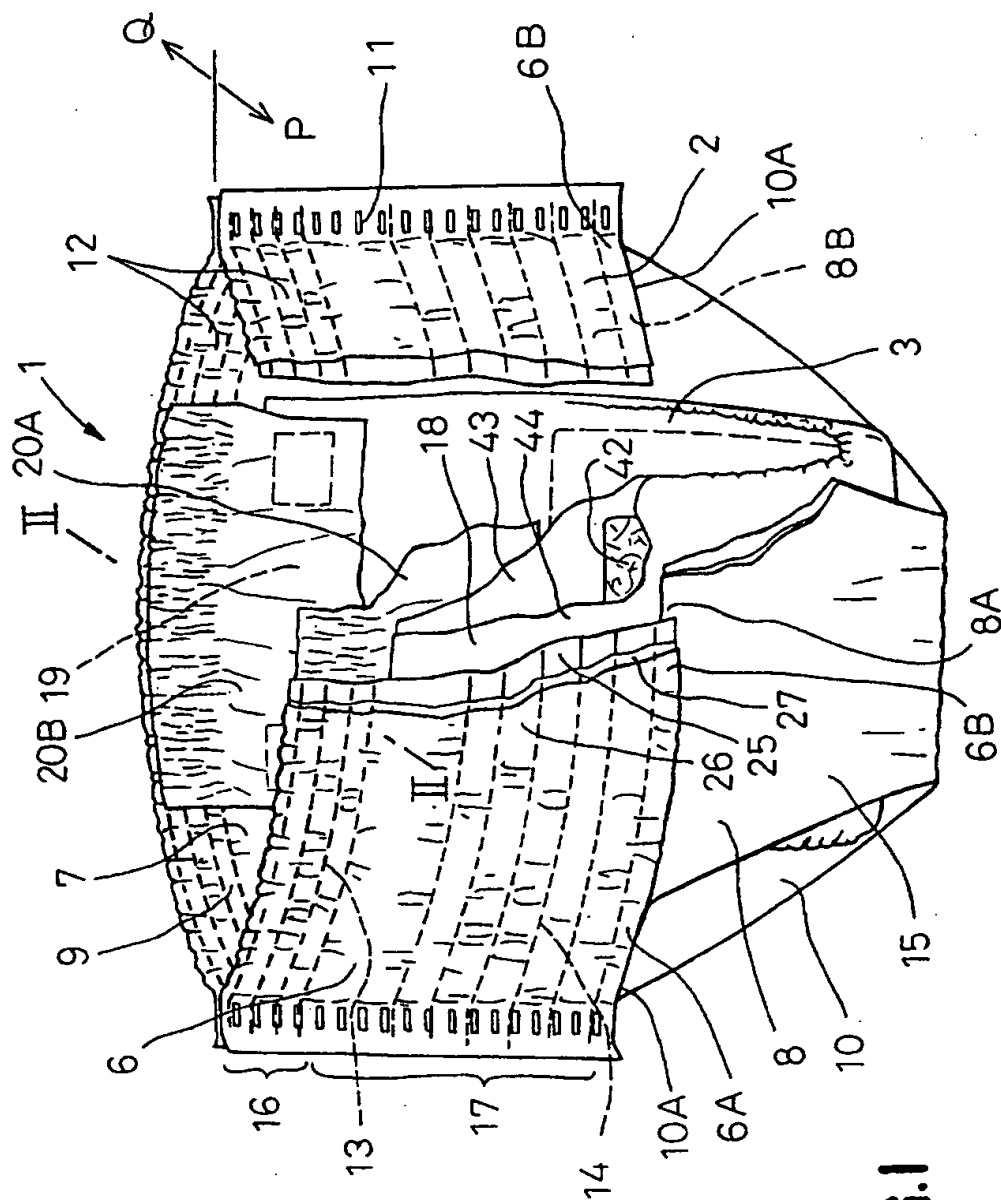
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FIG.2

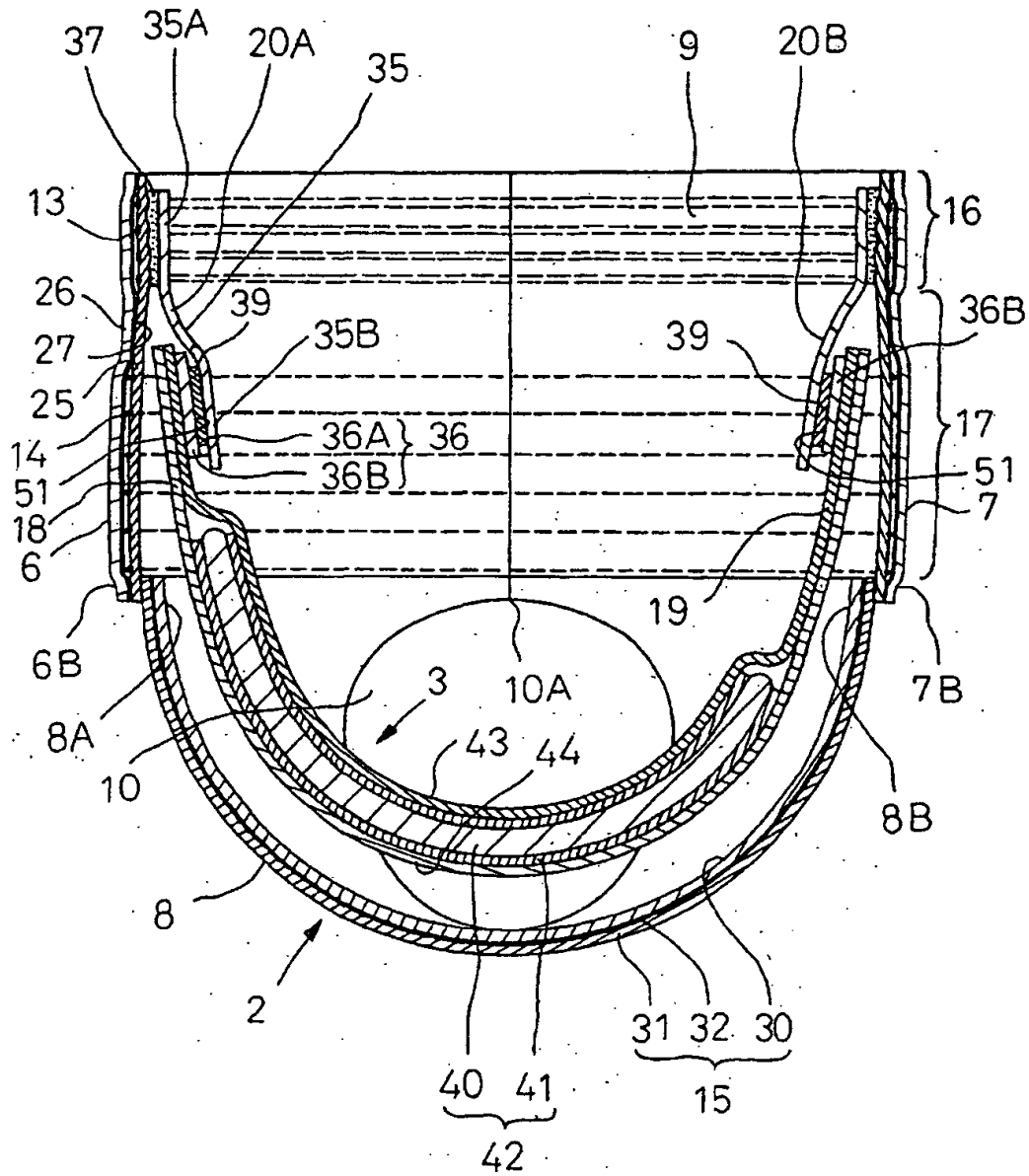


FIG.3

